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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 09/670,917 | 09/29/2000 | Norikazu Mizuno | 81877.0007 | 1895 |

26021 7590 06/04/2003

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EXAMINER

GUERRERO, MARIA F

ART UNIT PAPER NUMBER

2822

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/670,917

Applicant(s)

MIZUNO ET AL.

Examiner

Maria Guerrero

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 4-28-03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-2, 6-8, and 22-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 2, 6-8 and 22-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 12.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This Office Action is in response to the Request for continued examination and the Amendment filed April 28, 2003.

Claim 3-5 and 9-21 are canceled.

Claims 1-2, 6-8, and 22-30 are pending.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Specification

3. The abstract of the disclosure is objected to because the abstract should be in the range of 50 to 150 words. Correction is required. See MPEP § 608.01(b).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-2, 6-8, 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlson et al. (U.S. 5,421,957) (cited by Applicant) in view of Laxman et al. (U.S. 5,874,368).

Carlson et al. teaches forming a silicon nitride film on a reaction container, removing silicon nitride film by introducing NF_3 gas (Abstract, col. 3, lines 10-15, Table

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I). Carlson et al. teaches the silicon nitride film is deposited by thermal CVD (col. 4, lines 5-25, 52-55). Carlson et al. discloses after a sufficient number of deposition process a film of sufficient thickness in the range of 1 to 5 micrometers builds up and can contaminate the process (col. 4, lines 43-51). Carlson et al. teaches removing the silicon nitride at a pressure of 12 torr or more (col. 6, lines 3-65). Carlson et al. shows the reaction container being made of quartz (col. 4, lines 1-5).

Carlson et al. fails to show forming the silicon nitride film with bis tertiary butyl amino silane and NH_3 . However, Laxman et al. shows forming a silicon nitride layer with bis tertiary butyl amino silane and NH_3 by chemical vapor deposition (col. 4, lines 5-20, col. 5, lines 35-50).

The determination of the appropriated accumulated thickness on the reaction container is considered to be obvious to a person of ordinary skill in the art because it is not critical to the invention." In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990). See also MPEP § 716.02- § 716.02(g).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Carlson et al. reference by including the formation of nitride films using bis tertiary butyl amino silane as taught Laxman et al. The modification would produce a silicon nitride film having superior uniformities and would eliminate buildup of the silicon nitride layer on internal chamber parts producing less global warming gas effluents.

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5. Claims 26-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carlson et al. (U.S. 5,421,957) (cited by Applicant) in view of Laxman et al. (U.S. 5,874,368) and Nagashima et al. (U.S. 5,129,958).

Carlson et al. teaches forming a silicon nitride film on a reaction container, removing silicon nitride film by introducing NF_3 gas (Abstract, col. 3, lines 10-15, Table I). Carlson et al. teaches the silicon nitride film is deposited by thermal CVD (col. 4, lines 5-25, 52-55). Carlson et al. discloses after a sufficient number of deposition process a film of sufficient thickness in the range of 1 to 5 micrometers builds up and can contaminate the process (col. 4, lines 43-51). Carlson et al. teaches removing the silicon nitride at a pressure of 12 torr or more (col. 6, lines 3-65). Carlson et al. shows the reaction container being made of quartz (col. 4, lines 1-5).

Carlson et al. fails to show forming the silicon nitride film with bis tertiary butyl amino silane and NH_3 . However, Laxman et al. shows forming a silicon nitride layer with bis tertiary butyl amino silane and NH_3 by chemical vapor deposition (col. 4, lines 5-20, col. 5, lines 35-50).

Carlson et al. fails to show purging the reaction container using NH_3 gas at least one of before and after of forming the silicon nitride film. However, Nagashima et al. shows the step of purging the reaction container using NH_3 gas (Abstract, col. 2, lines 20-60, col. 3, lines 1-20).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Carlson et al. reference by including the teaching of Laxman et al. and Nagashima et al. The modification would produce a silicon nitride

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film having superior uniformities and would eliminate the deleterious effects of fluorine after the cleaning process during previous to deposition (Nagashima et al., col. 1, lines 50-55, col. 2, lines 3-10).

Response to Arguments

6. Applicant's arguments with respect to claims 1-2, 6-8, and 22-30 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Mizuno et al. (U.S. 6,486,083) teaches forming a silicon nitride film with bis tertiary butyl amino silane and NH_3 . Johnson et al. (U.S. 5,868,852) and Mendicino et al. "Remote Microwave Technology for Chamber Clean to Reduce PFC Emissions" teach a cleaning process using NF_3 .

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maria Guerrero whose telephone number is 703-305-0162.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7724 for After Final communications.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Maria Guerrero
Maria Guerrero
Patent Examiner
May 31, 2003